

# Aid, the Incentive Regime, and Poverty Reduction

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Aid spurs growth and poverty reduction only in a good policy environment so it should be targeted to countries that have improved their economic policy. That aid tends to be allocated relatively indiscriminately is one factor that undermines its potential impact.



## Summary findings

Spurring growth in the developing world is one stated objective of foreign aid. Another, more commonly cited, objective is reducing poverty. Generally poverty reduction and growth go hand in hand, but could aid mitigate poverty without measurably affecting growth?

Burnside and Dollar examine how foreign aid affects infant mortality — an important social indicator that provides indirect evidence that the benefits of development are reaching people everywhere.

They conclude that in developing countries with weak economic management — evidenced by poor property rights, high levels of corruption, closed trade regimes, and macroeconomic instability — there is no relationship between aid and the change in infant mortality. In distorted environments, development projects promoted by donors tend to fail.

And aid resources are typically fungible, so the aid does not in fact finance these projects. Aid finances the whole public sector at the margin, which is why the quality of management is the key to effective assistance.

A government that cannot put effective development policies in place is unlikely to oversee the effective use of foreign aid.

On the other hand, there is a relationship between aid and a change in infant mortality when the recipient country has relatively good management. When management is good, additional aid worth 1 percent of GDP has a powerful effect, reducing infant mortality by 0.9 percent.

In other words, aid spurs growth and improvements in social indicators only in a good policy environment.

These findings strengthen the case for targeting foreign aid to countries that have improved their economic policy. But after controlling for per capita income and population, there has been almost no relationship between countries' economic policies and the amount of aid they get. The relatively indiscriminate allocation of assistance is one factor undermining the potential impact of aid.

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## ***Aid, the Incentive Regime, and Poverty Reduction***

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## ***1. Introduction***

Foreign aid has a strong positive effect on growth in low-income countries with good policies; it has no measurable effect in countries with severely distorted policy regimes: that was the main finding of our first paper [Burnside and Dollar (1997)]. While that result was consistent with other econometric and case study work on aid,<sup>1</sup> it left open a number of important questions. Spurring growth in the developing world is one stated objective of foreign aid; but the most commonly cited objective is poverty reduction. In general, poverty reduction and growth go hand-in-hand, but it is still possible that foreign aid has been successful at mitigating poverty but not had much measurable effect on growth.

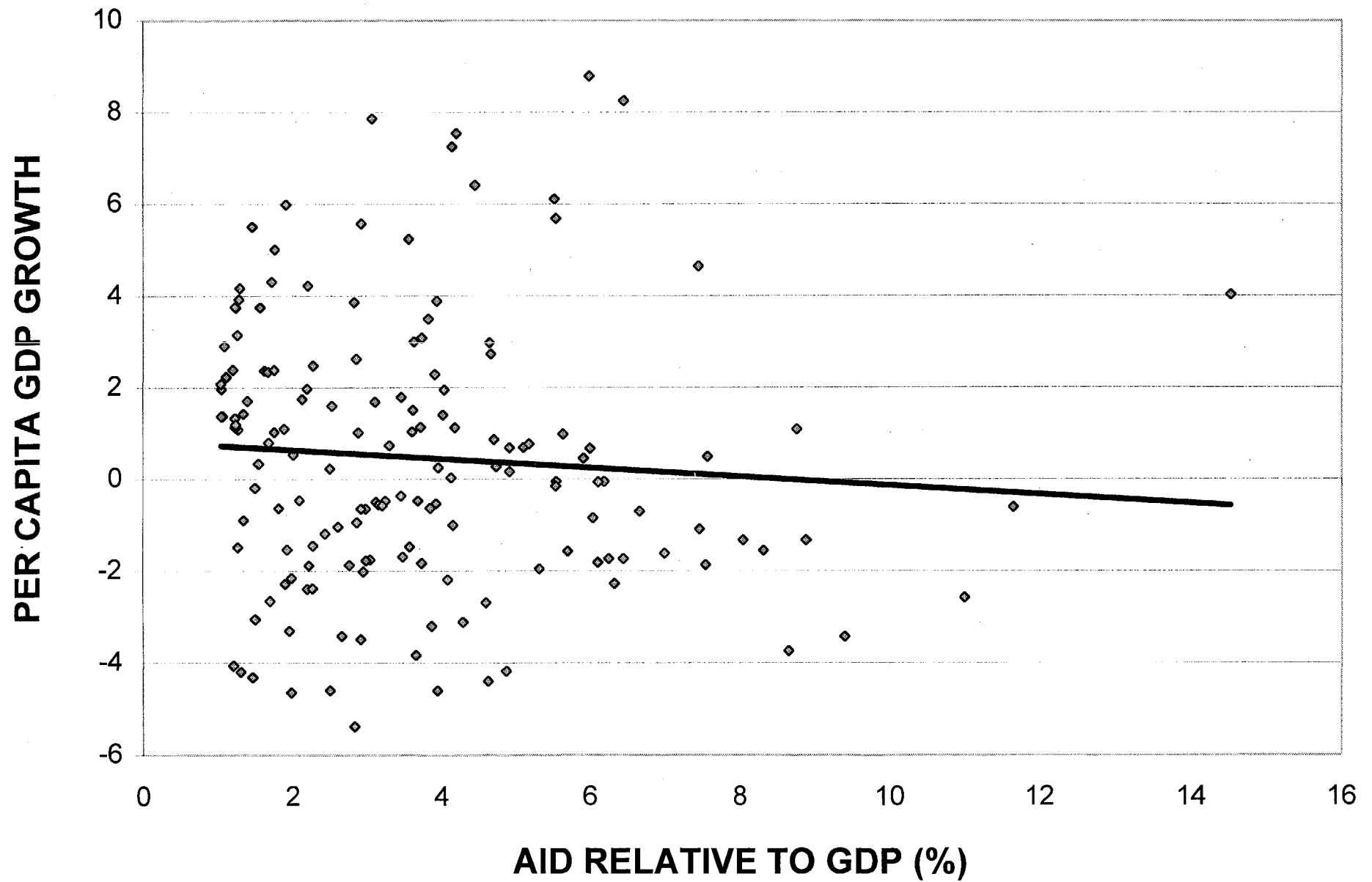
The primary purpose of this paper is to examine the effect of foreign aid on infant mortality, an issue of interest for two reasons. First, infant mortality is an important social indicator in its own right. Second, changes in infant mortality provide indirect evidence about whether the benefits of development are reaching the broad mass of the population. We begin in the next section by briefly summarizing the main results of our study of aid and growth. In doing this, we provide an intuitive view of the model that underpinned our work on growth. Furthermore, we broaden our indicator of “good policy” to include more micro or institutional dimensions. In the third section of the paper we turn to the issue of aid and infant mortality. We develop a simple model and estimate it with the same panel data used in our growth paper. To address the likely endogeneity of aid we instrument for it in a 2SLS procedure.

The main findings are consistent with our earlier results. In a poor incentive environment, there is no measurable effect of aid on the decline in infant mortality. Thus, there is no basis from this additional work to change our recommendation that aid be more sharply targeted to low-income countries that have put good policies into place. Furthermore, there is some evidence that in a good policy environment aid has an immediate and direct impact on infant mortality, though the results are not as strong statistically as the results for growth.

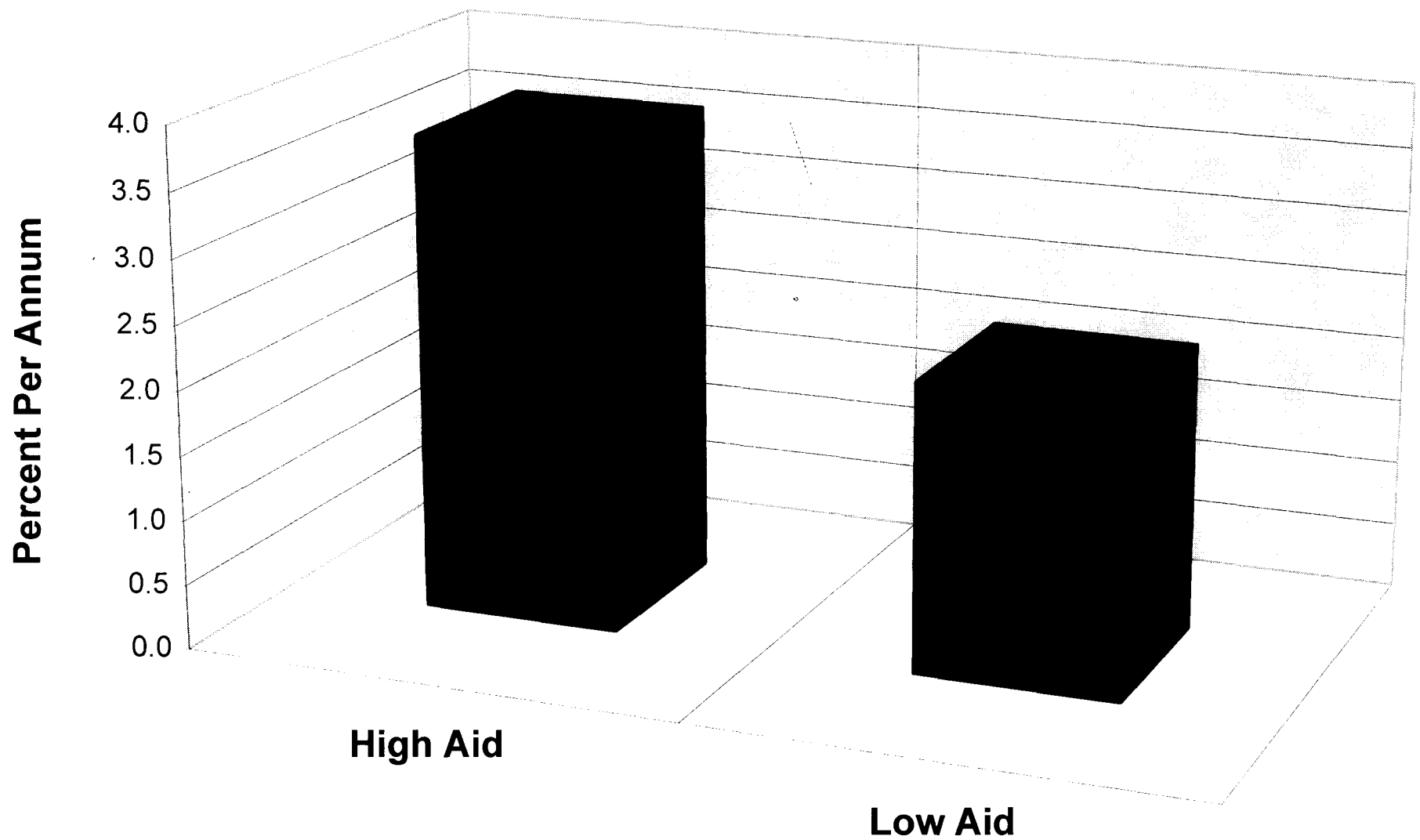
## ***2. Aid, Growth, and the Incentive Regime***

Our basic finding on aid, policies, and growth can be summarized in two simple figures. There is very little relationship between the amount of aid that countries receive and their growth rates (Figure 1).<sup>2</sup> This figure relates four-year average growth rates to the amount of aid received during that period, relative to real PPP GDP. Boone (1994) has shown that, if other variables are added to the analysis and aid treated as an endogenous variable, this non-relationship remains. The picture changes, however, if one distinguishes among countries based on their economic policies. In our earlier work we developed an index of monetary, fiscal, and trade policies and used this to distinguish among good policy observations. For good policy observations, those with large amounts of aid have grown much faster (3.7% per annum per capita on average) than those with small amounts of aid (2.2%) (Figure 2).<sup>3</sup> For countries with poor policy, on the other hand, it is not the case that those with more aid have grown faster than those with small amounts.

**Figure 1. Aid and Growth in a Panel of Developing Countries, 1970 - 1993**



**Figure 2. Per Capita GDP Growth in Low Income Countries  
with Sound Management**



In our earlier paper we also developed a formal growth model to show why it makes sense that the incentive regime would affect the impact of foreign aid. The main features of the model were as follows:

- savings and accumulation respond to the return to capital (which can be thought of as a broad aggregate of physical and human capital);
- there are diminishing marginal returns to capital (a neoclassical production function);
- various distortions such as high taxation, inflation, or corruption reduce the return to capital and hence the incentive to save and invest;
- even with a high return to capital, poor countries have difficulty saving because of subsistence needs; and
- imperfections in international capital markets limit the flow of private finance to low-income countries.

This model corresponds closely to a number of observed features of developing countries. First, there is very clear evidence that distortions and the incentive regime affect the growth rates of developing countries. Some of the important distortions that have been identified in the literature on growth are closed trade regimes (Dollar, 1992; Sachs and Warner, 1995); high inflation (Fischer, 1993); and large fiscal deficits (Easterly and Rebelo, 1993). In our first paper we formed an index of these three policies. However, it is also the case that growth is affected by institutional issues such as poor protection of property rights or high levels of corruption (Knack and Keefer, 1995). In



our data set countries with good macroeconomic policies and good institutions have grown much faster than those with poor policies and weak institutions (Figure 3).<sup>4</sup>

For this paper we compiled an index of economic management including both the macro policies and the institutional dimension:

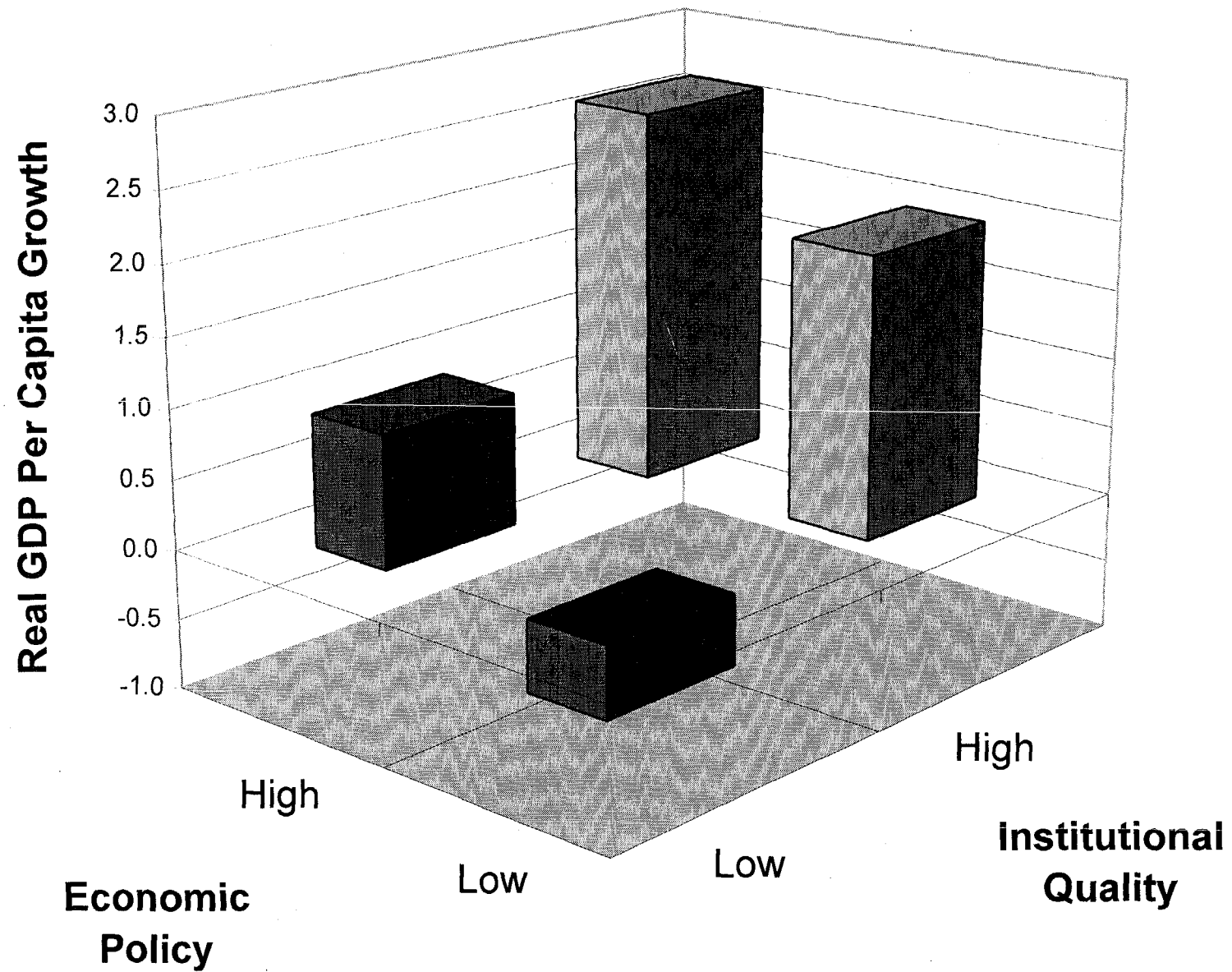
$$\text{Management} = -1.8 + .65 \times \text{ICRGE} + 5.4 \times \text{Fiscal} - 1.4 \times \text{Inflation} + 2.1 \times \text{Open}$$

where ICRGE is a measure of strength of property rights, absence of corruption, and quality of the bureaucracy; Open is the Sachs-Warner measure of trade openness; Inflation is the rate of increase of the price level; and Fiscal is the budget surplus relative to GDP.<sup>5</sup>

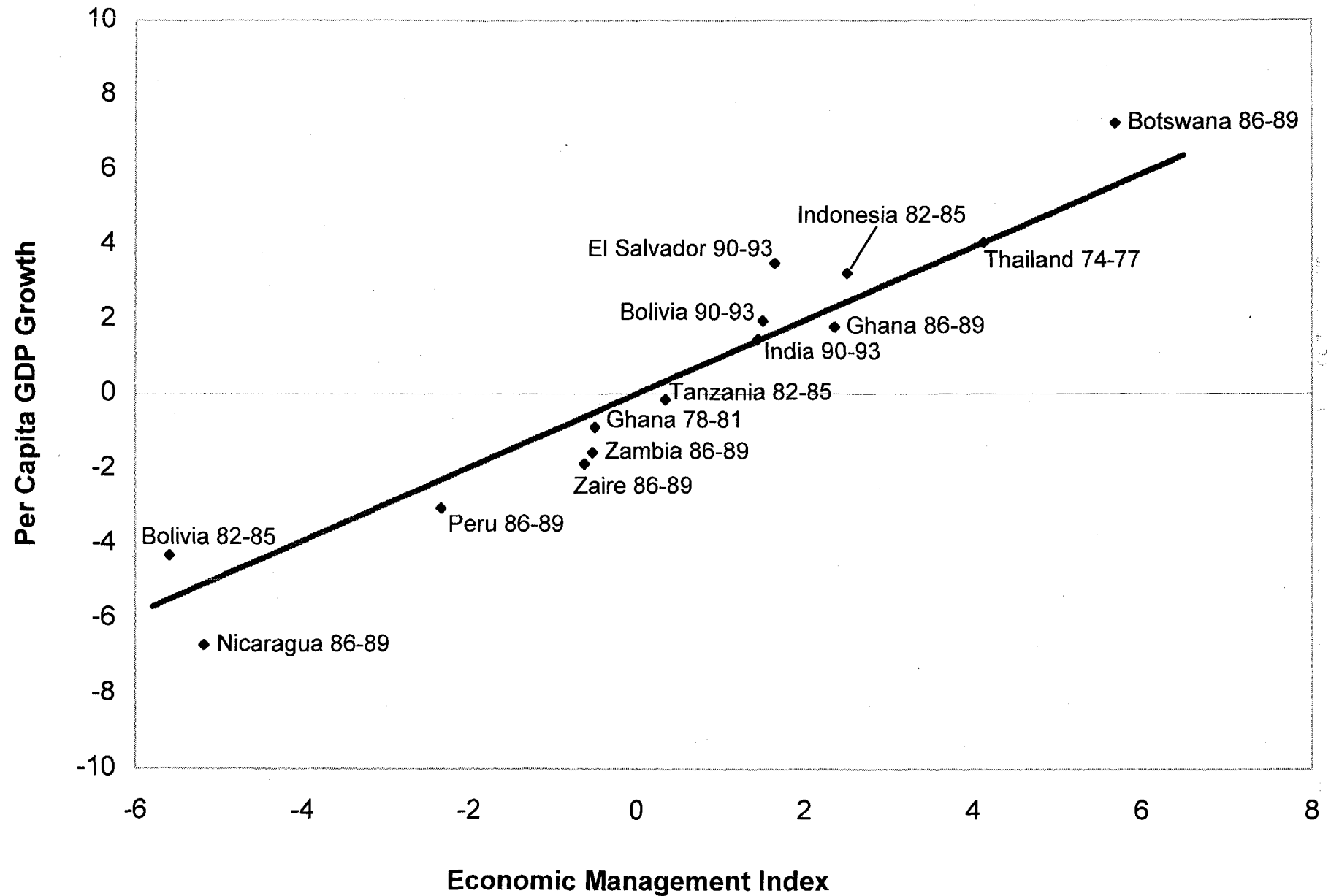
In our panel of 56 developing countries, there is a strong correlation of per capita growth with this index of the incentive regime (Figure 4). (We have averaged the data over four-year periods, beginning with 1970-73 and ending with 1990-93.) Botswana or Thailand would be examples of very good incentive regimes. Indonesia fares pretty well, though its weak legal system and high level of corruption result in it scoring less well than Botswana, for example. Poor policy examples are Tanzania or Zambia (all identified in Figure 4). The difference in policy between Indonesia (1982-85) and Tanzania in the same period should have been “worth” about 3 percentage points of growth.

Because the information has been organized into a panel, countries can shift over time. Bolivia and Ghana are examples of countries that had very poor policy in the early 1980s, and then reformed to become good policy countries in the 1990s. The macro policies included in this index are all ones that can be changed quickly if a society and government want to reform, and there are many examples of large policy improvements between the 1980s and 1990s. This is one of the encouraging findings of the new growth

**Figure 3. Institutions, Policies and Growth**



**Figure 4. Economic Management and Growth in a Panel of Developing Countries**

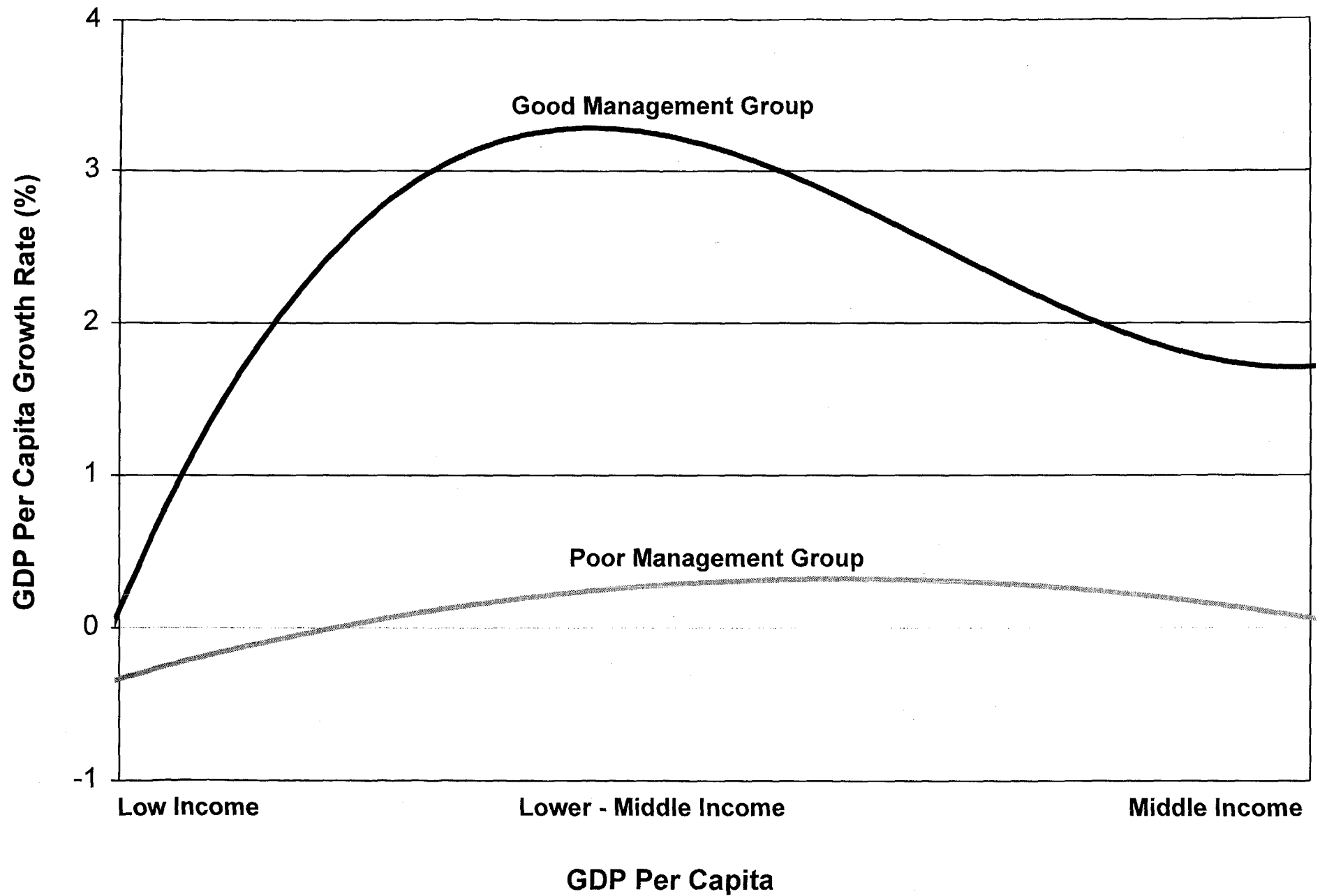


literature, that measures that are feasible for most countries have a significant impact on their growth rates. At the same time the more institutional aspects of good management -- such as rule of law -- take longer to improve.

This index of the incentive regime can be used to illustrate the main features of our growth model. We used the index to divide the panel into a "good policy" half and a "poor policy" half. (Since it is a panel Ghana, for example, can be in the poor policy group in one period and in the good policy group in a later period.) Figure 5 displays the relationship between income level at the beginning of a period and subsequent growth, for the two groups separately. (These are simply estimates of a non-linear relationship between growth rates and initial income.) For the good policy group, middle-income countries grow faster than higher income ones (a key finding of the Sachs-Warner, 1995, study). The real superstars -- the East Asian tigers or Chile -- are found in this good-policy, middle-income group. These countries have a high return to capital and are attracting a lot of direct foreign investment. They are gradually catching up with the developed world. As they converge on the industrial countries, their growth tends to slow down. In our model that results from diminishing returns to capital.

The poor policy group grows slowly at all income levels -- these countries are falling further and further behind the advanced ones. It is interesting to note that the countries that have cut themselves off from globalization -- through restrictive trade practices and unstable macro policies -- are the ones that are losing out. From the point of view of the study of aid, what is particularly interesting is the steep upward-sloping part of the curve for the good policy group. When low-income countries such as Mali put good

**Figure 5. Growth Rate and Income Level**



policies into place, they perform better but they do not get the spectacular results of the middle-income countries. There are a variety of explanations for this, which are not mutually exclusive. These low-income countries may have other characteristics that retard growth -- being landlocked, for example. Even after controlling for other characteristics, however, we find this non-linear relationship.

It is possible that their own poverty constrains their ability to save and invest, even if good policies are in place. If international capital markets were perfect, then private money would flow to these reformers. But imperfections such as asymmetric information could undermine this outcome. Mali may be serious about reform, but if private investors cannot accurately assess the situation then they may hold back. Their reticence may undermine an otherwise successful reform program. In our model this is the feature that generates the pattern in Figure 5: despite a high return to capital with good incentives in place, extreme poverty retards saving and international capital markets are imperfect. The same pattern could as well be generated by a model in which there are increasing returns to capital at very low income levels (and decreasing returns beyond some point). For example, the downward-sloping part of the "good policy" curve could reflect the fact that developing countries with proper incentives can borrow technologies from more advanced ones and that these possibilities diminish as countries approach the level of the advanced ones. The upward-sloping part of the curve may then reflect the fact that a threshold level of human capital per person may be needed to take advantage of the opportunities to borrow technologies.

Whatever the underlying model, this figure suggests an obvious role for foreign aid in spurring developing country growth. Financial aid to poor countries that have put good policies into place should have a high return. It should help these countries move up the steep part of the curve and achieve rapid growth. Effective assistance necessarily should be temporary. At the same time, there is no reason to expect that providing finance into a poor policy environment would accelerate the growth rate. The poor policy countries have weak incentives and a low return to capital. Intuitively, one would not expect aid to have a large impact in such an environment.

Whether or not aid has a greater effect on growth in a good incentive environment is what we tested in our first paper. The growth equation that emerges from our model can be stated as follows:

Per capita GNP growth depends on  
initial income  
other initial conditions  
index of the incentive regime  
aid relative to GNP  
aid/GNP interacted with the incentive regime  
error term.

The main results from our earlier paper are presented in Table 1 (though here we are using the broader measure of “good policy.”).<sup>6</sup> The index of the incentive regime has a large amount of explanatory power (the individual elements could alternatively be used in lieu of the index). Aid receipts by themselves have no significant effect on growth in the OLS

**Table 1. Panel Growth Regressions**

Time dimension: six four-year periods. 1970-73 to 1990-93

Countries: 56 aid recipients

Dependent variable: Growth rate of per capita GDP

Regression No.	(1)	(2)	(3)
Observations	272	272	272
Method	OLS	OLS	2SLS
Constant	3.43	2.42	7.33
	(0.76)	(0.53)	(1.11)
Initial GDP per capita	-0.49	-0.36	-1.02
	(0.84)	(0.61)	(1.22)
Ethnic fractionalization	-.005	-.004	-.008
	(0.73)	(0.56)	(0.77)
Assassinations	-0.40	-0.38	-0.31
	(1.50)	(1.40)	(1.03)
Ethnic x assassin	.007	.006	.004
	(1.56)	(1.30)	(0.78)
M2/GDP (lagged)	0.02	0.03	0.03
	(1.64)	(1.77)	(1.58)
Sub-Saharan Africa	-1.40	-1.77	-1.86
	(1.91)	(2.40)	(2.22)
East Asia	0.91	1.28	1.67
	(1.62)	(2.07)	(2.40)
Policy index	1.02	0.79	0.38
	(7.01)	(4.32)	(1.38)
Gov consumption	-7.30	-7.51	2.08
	(1.57)	(1.65)	(1.38)
Aid/GDP	0.11	0.16	-0.37
	(0.86)	(1.18)	(0.82)
Aid x Policy	--	0.26	0.80
		(3.07)	(2.37)
Aid <sup>2</sup> x Policy	--	-.03	-.08
		(3.66)	(1.74)
R <sup>2</sup>	.40	.41	
Adj. R <sup>2</sup>	.36	.37	

Note: t-statistics (in parentheses) have been calculated with White's heteroskedasticity-consistent standard errors, for all regressions in the paper.



specification (Regression 1). Our main finding is that aid interacted with the policy index has a strong positive association with growth, while aid squared interacted with the policy index has a negative coefficient (Regression 2). There is an obvious simultaneity problem in these OLS regressions: aid may be deliberately allocated to countries in difficulty due to exogenous shocks (drought, for example). We get around that by instrumenting for aid with variables that are correlated with aid but that have been shown not to belong in the growth regressions: population and measures of donor interests, such as membership in the franc zone. In Regression 3 we instrument for aid, aid interacted with policy, and aid squared interacted with policy. The 2SLS regression has the same qualitative results as the OLS regression.

These results indicate that the effect of aid on growth depends on the quality of the incentive regime as well as on the volume of aid received. Aid has a strong effect on growth in countries with a good incentive regime; in a weak environment the impact is not statistically different from zero. The negative coefficient on the quadratic term means that there are diminishing marginal returns to aid: its impact declines as the volume of aid grows. To the extent that the objective of aid is to promote growth in developing countries, these results imply that aid should be sharply targeted to developing countries that have a sound incentive regime.

### 3. *Aid and Infant Mortality*

If aid is not supporting productive investments in countries with poor policies, then it must be financing either unproductive investments or consumption. Supporting consumption in very poor countries is not necessarily a bad thing: the issue is, whose consumption? The central objective of development assistance is poverty reduction. It may be that aid is supporting the consumption of very poor households, which leads to reductions in infant mortality and improvements in other social indicators. These developments may support growth in the very long term, in a way not picked up by econometric studies.

There is quite a bit of evidence that the consumption that is being supported by aid is *government consumption*. Government consumption is a broad category that includes recurrent spending on health and education (these might be considered investments, but the accounting tradition is to record them as government consumption). It also includes spending on social relief, defense, and administration. Thus, large government consumption could reflect a big, corrupt bureaucracy, or it could reflect large expenditures on social welfare that are helping to reduce poverty. One cannot say a priori if it is good or bad for development.<sup>7</sup>

There are different estimates from different studies, but somewhere between one-half and three-quarters of bilateral aid finances additional government consumption. Furthermore, the empirical growth literature finds that government consumption has no robust effect on growth. Some studies find a negative effect, others a zero relationship. The finding that aid largely finances government consumption, which in turn has no

positive effect on growth, helps explain why aid is not fostering growth in many developing countries. It leaves open the question, however, of whether the consumption might be helping the poor through social expenditures.

Ideally, we would want to look directly at the effect of aid on consumption of the poor or on the incidence of poverty, but the number of countries for which such data are available over time is small. The approach that we take here is to look directly at the effect of aid on infant mortality, an important social indicator for which data are widely available. Following earlier work, the model that we have in mind is:

Decline in infant mortality depends on  
initial conditions  
growth of per capita income  
government consumption  
aid/GNP  
error term.

Given our findings about growth, however, we can substitute for it and have the following reduced form equation:

Decline in infant mortality depends on  
initial conditions  
incentive regime  
government consumption  
aid/GNP  
aid/GNP interacted with incentive regime

error term.

It has been well established that growth leads to reductions in infant mortality (Pritchett and Summers, 1995), so it would be consistent with our earlier findings to see a positive coefficient on the interactive term.<sup>8</sup> An important additional question is whether government consumption and/or aid directly affects infant mortality, regardless of the incentive regime. Once again we have to be concerned about the correlation of aid with the error term (aid deliberately given to countries in distress) so that it is necessary to instrument for aid and for aid interacted with the incentive regime.

In the OLS regression (#1 in Table 2) there is no significant relationship between aid and the decline in infant mortality. Actually, the model only does moderately well in explaining the decline in infant mortality over the relatively short period of time, four years. There is a kind of “divergence” in that countries with high infant mortality to begin with show smaller declines, *ceteris paribus*. Countries with sound management have faster declines in infant mortality, but the statistical significance of the relationship is not strong. There is no effect of government consumption on infant mortality. Regression 2 is the same, except that we instrument for aid with population and donor interest variables. There are insignificant positive coefficients on both aid and government consumption. These results provide important information that supplements our earlier work. There is no evidence that the permanent component of aid -- which is what is extracted by the instrumental variables technique -- has any affect on this important social indicator within a four-year time period. Thus, in a poor policy environment, neither growth nor decline in infant mortality is supported by aid on average.

**Table 2. Panel Regressions for Decline in Infant Mortality**

Time dimensions: six four-year periods. 1970-73 to 1990-93

Countries: 56 aid recipients

Dependent variable: Percent decline in infant mortality (annual rate)

Regression No.	(1)	(2)	(3)	(4) <sup>a</sup>
Observations	276	273	273	273
Method	OLS	2SLS	2SLS	2SLS
Constant	7.5 (4.56)	7.8 (4.01)	6.3 (3.16)	6.5 (3.20)
Initial infant mortality	-1.13 (3.31)	-1.2 (2.91)	-0.94 (2.24)	-1.01 (2.33)
Ethnic fractionalization	-0.01 (1.72)	-0.01 (1.53)	-0.01 (1.44)	-0.01 (1.09)
Assassinations	0.05 (0.77)	0.05 (0.74)	0.04 (0.45)	0.03 (0.32)
M2/GDP (lagged)	0.00 (0.29)	0.00 (0.15)	0.01 (0.52)	0.02 (0.85)
Sub-Saharan Africa	-0.58 (1.46)	-0.67 (1.66)	-1.39 (2.95)	-1.44 (3.08)
East Asia	-0.30 (0.72)	-0.32 (0.75)	0.15 (0.25)	0.04 (0.07)
Policy index	0.19 (1.37)	0.19 (1.35)	-0.10 (0.32)	-0.09 (0.29)
Gov consumption	1.96 (0.56)	1.62 (0.37)	4.53 (0.84)	3.08 (0.51)
Aid/GDP	-0.03 (0.52)	0.02 (0.16)	0.04 (0.23)	0.11 (0.50)
Aid x Policy	--	--	0.53 (1.55)	0.75 (1.75)
Aid <sup>2</sup> x Policy	--	--	-0.06 (1.57)	-0.12 (1.82)
R <sup>2</sup>	.21			
Adjusted R <sup>2</sup>	.17			

<sup>a</sup> The measure of aid in regression 4 excludes technical assistance.

Note: t-statistics (in parentheses) have been calculated with White's heteroskedasticity-consistent standard errors, for all regressions in the paper.

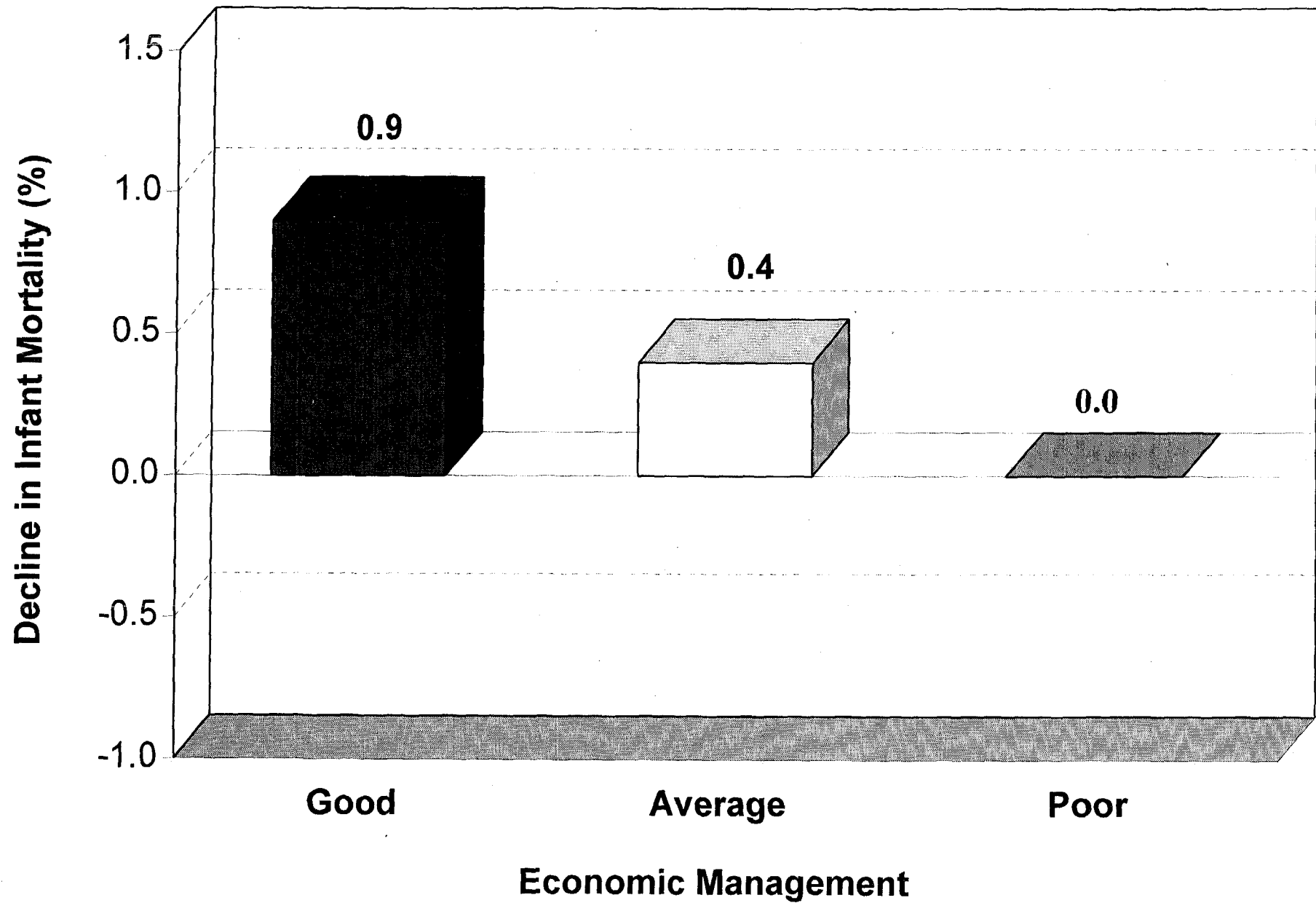
As with growth, there is, however, a relationship between decline in infant mortality and the interaction of aid and the incentive regime. The interaction term has a positive coefficient and the quadratic term a negative one (Regression 3). The statistical significance is weaker than in the growth regressions. It is interesting that the t-statistics rise if technical assistance is taken out of the measure of aid (Regression 4). This change could reflect the fact that the impact of TA is not likely to be seen in a social indicator within a four-year time frame. Alternatively, it could be that technical assistance has less impact than capital assistance. Recall that the only impact at all here is in countries with sound management. It may be that financial assistance has a sharp impact in that case, but that technical assistance is less needed.

According to these estimates, the impact of aid on the decline in infant mortality depends on the quality of the incentive regime and on the volume of assistance. Based on Regression 3, the derivative of the decline in infant mortality with respect to aid is

$$0.03 + 0.53 \times \text{Management Index} - 0.12 \times \text{Aid} \times \text{Management}.$$

The mean of aid is 1.7. (We measure aid relative to real PPP GDP, yielding smaller figures than those that result from deflating aid by nominal GNP.) Evaluating this derivative at the mean of aid, we find that the estimated decline in infant mortality resulting from an additional 1% of GDP in assistance is zero in a poor policy environment (index = 0); 0.4 percent in an average environment (index = 1.1); and 0.9 percent in a “good management” environment, defined as one standard deviation above the mean of the index (that is, a value of 2.7) (Figure 6). Referring to Figure 4, examples would be

**Figure 6. Decline in Infant Mortality from 1% of GDP in Aid**



poor policy, Zambia or Zaire (1986-89); average policy, India in the 1980s; and good policy, Ghana (1986-89) or Indonesia (1982-85).

One potential criticism of this work is that low-income countries virtually by definition have poor institutions and policies. Thus, it should be emphasized that the econometric results indicate a sharp positive impact of aid for “relatively good policies” that are well within the range of the historic experience of low-income countries. India, Uganda, Ethiopia, and Vietnam are all examples of low-income countries that have reformed to become “good policy countries” in the 1990s. There remain significant problems with their incentive regimes and none of these countries scores nearly as well as, say, Botswana or Thailand on the management index. The point is that the movement from very distorted regimes to relatively good regimes is necessary both for positive per capita growth and for effective use of aid.

#### *4. Conclusions*

In developing countries with weak economic management -- evidenced by poor property rights, high corruption, closed trade regimes, and macroeconomic instability -- there is no relationship between aid and the change in infant mortality. In these distorted environments, development projects promoted by donors tend to fail [Isham and Kaufmann (forthcoming); Isham, Kaufmann, and Pritchett (1997)]. Furthermore, aid resources are typically fungible, so that these projects are not in fact what is financed by aid [Feyzioglu, Swaroop, and Zhu (1998)]. Aid is financing the whole public sector at the margin, which is why the overall quality of management is key to effective assistance. A



government that cannot put effective development policies into place is not likely to oversee effective use of foreign aid.

On the other hand, there is a relationship between aid and the change in infant mortality in cases in which a recipient has relatively good management. In this situation an additional 1% of GDP in aid has a powerful effect, reducing infant mortality by 0.9%. These results are consistent with what we found for growth in our earlier work: aid spurs growth only in a good policy environment.

These new findings strengthen the case for targeting foreign aid to countries that have made improvements in economic policy. However, after controlling for per capita income and population, there has been little relationship between the amount of aid that countries get and their economic policies [Alesina and Dollar (1998)]. The relatively indiscriminate allocation of assistance is one factor undermining the potential impact of aid.

## Notes

<sup>1</sup> Boone (1994); Killick (1991); Krueger, Michalopoulos, and Ruttan (1989); Van De Walle and Johnston (1996).

<sup>2</sup> Here we are using the aid to real PPP GDP measures developed in Burnside and Dollar (1997). For this figure we dropped the observations with aid less than 1% of GDP. These are mostly middle-income countries such as Brazil, Korea, or Mexico. The statistical relationship between aid and growth is the same whether the middle-income countries are included or not.

<sup>3</sup> To create this picture we took the observations with a policy index above 2 (roughly the top third of the distribution) and divided them into a low-aid half and a high-aid half. This picture summarizes in a simple way what we showed in our first paper to be a very robust relationship.

<sup>4</sup> In this picture we used the median of the macroeconomic policy index and the median of the ICRGE measure of institutional quality to create four cells, and averaged growth rates for the observations in each cell. The picture summarizes relationships that have been established in the literature cited in this paragraph.

<sup>5</sup> The weights in this index reflect the relative importance of the different factors in a growth regression. The constant derives from the non-policy variables in the regression (initial conditions) evaluated at their means. The mean of this index, 1.1, is the same as the mean growth rate of per capita GNP for the sample. A one unit increase corresponds to a policy improvement that should result in an increase in the growth rate of 1 percentage point, other things equal.

<sup>6</sup> The measure of aid comes from Fernandez-Arias, Servén, and Chang (1998); it combines grants with the grant component of concessional loans. The statistical results are the same if we use the more traditional OECD measure of aid, which combines grants with net disbursements of concessional loans with at least a 25% grant element.

<sup>7</sup> Filmer and Pritchett, 1997, find that there is little effect of health expenditure on infant or child mortality, concluding that the quality of government spending is more important than quantity.

<sup>8</sup> Some insight into why growth typically leads to improvement in social indicators comes from Bruno, Ravallion, and Squire (1998). They show that for the majority of developing countries there is no time trend in the distribution of income. Thus, increases in per capita income tend to benefit all segments of the income distribution and lead to broad-based gains in social indicators. Similarly, Ravallion and Chen (1997) find that growth and poverty reduction are highly correlated across countries.

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